OXFORD

INTERNATIONAL
AQA EXAMINATIONS

Please write clearly in block capitals.

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Forename(s) _____

Candidate signature _____

I declare this is my own work.

INTERNATIONAL GCSE
COMBINED SCIENCE

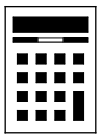
C

Paper 1 Biology Core

Wednesday 27 October 2021 07:00 GMT Time allowed: 1 hour 45 minutes

Materials

For this paper you must have:
- a pencil and a ruler
- a scientific calculator.



Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- All working must be shown.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.

For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
9	
TOTAL	

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 100.
- You are expected to use a scientific calculator where appropriate.

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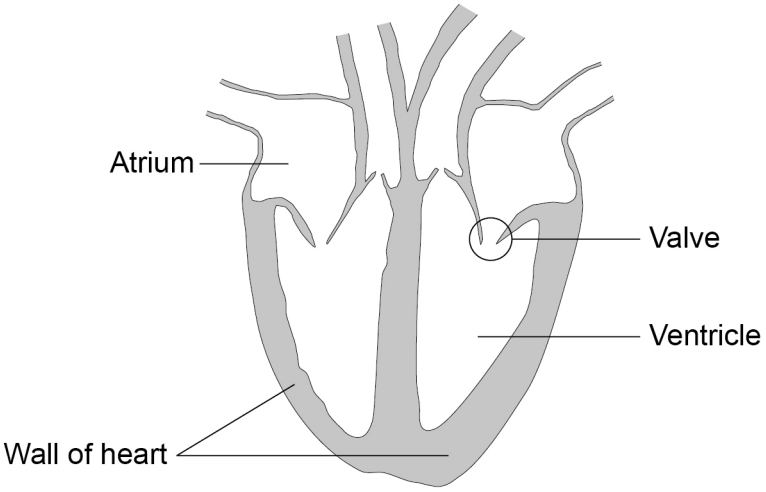
Answer **all** questions in the spaces provided.

0 1 The human circulatory system includes the heart, blood vessels and blood.

Figure 1 shows the heart.

Figure 1



0 1 . 1 What is the function of the heart?

[1 mark]

0 1 . 2 What is the wall of the heart made of?

[1 mark]

Tick (✓) **one** box.

Glandular tissue ☐

Muscular tissue ☐

Palisade tissue ☐

Do not write outside the box

0 1 . 3 How many chambers are there in the heart?

[1 mark]

Tick (✓) **one** box.

2 ☐

4 ☐

6 ☐

8 ☐

0 1 . 4 Why does the heart have valves?

[1 mark]

Tick (✓) **one** box.

To increase oxygen levels in the blood ☐

To keep blood flowing in one direction ☐

To slow down circulation of the blood ☐

0 1 . 5 Blood flows around the body in blood vessels.

Which type of blood vessels have valves?

[1 mark]

Tick (✓) **one** box.

Arteries ☐

Capillaries ☐

Veins ☐

Do not write outside the box

Blood contains blood cells suspended in a fluid.

0 1 . 6 What is the function of **white** blood cells?

[1 mark]

Tick (✓) **one** box.

Carry oxygen around the body ☐

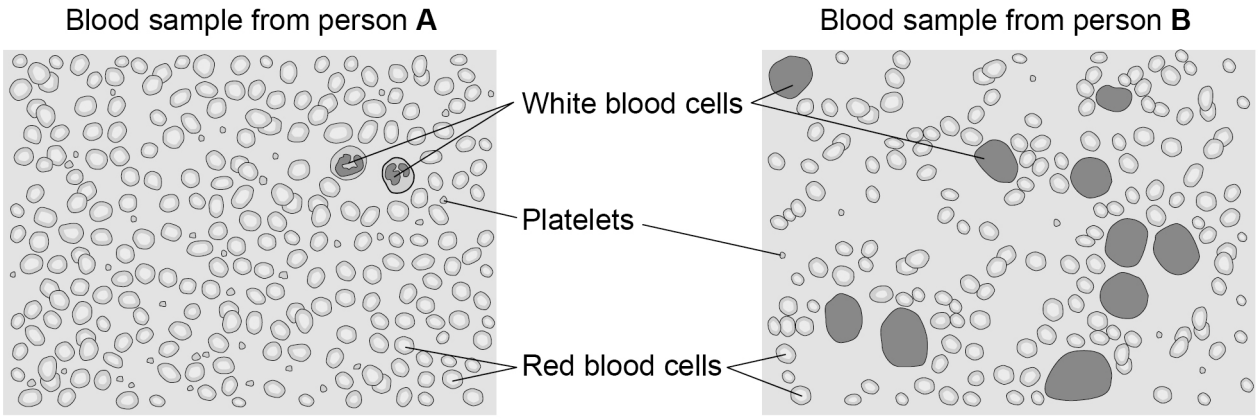
Defend the body against microorganisms ☐

Transmit nerve impulses ☐

A doctor tests blood samples to check if a patient has a blood disorder.

Figure 2 shows blood samples from two different people.

Figure 2



Person **A does not** have a blood disorder. The blood sample from person **A** is normal.

Person **B** is being tested for a blood disorder.

Do not write outside the box

0 1 . 7 Give **two** reasons why the doctor concludes that person **B does have** a blood disorder.

Use **Figure 2**.

[2 marks]

1 _____

_____

2 _____

_____

0 1 . 8 How can the doctor increase confidence in the results of the blood test for person **B**?

[2 marks]

Tick (✓) **two** boxes.

- Add water to the blood sample from the person. ☐
- Ask the person how they feel after the blood test. ☐
- Test at least three blood samples from the person. ☐
- Test blood samples from people of different ages. ☐
- Use different methods to test the blood of the person. ☐

10

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0 2 Pangolins are mammals. Pangolins have scales covering their body instead of hair.

Variation in pangolins may be caused by:

- genes
- the environment
- both genes and the environment.

Figure 3 shows a pangolin.

Figure 3

0 2 . 1 Complete **Table 1** to show the causes of variation in pangolins.

Put **one** tick (✓) in each row.

[3 marks]

Table 1

Characteristic	**Variation caused by**		
	genes	the environment	both genes and the environment
Body mass			
Broken scale			
Long nose			
Scales made of protein			

Do not write outside the box

0 2 . 2 Pangolins roll into a ball when they are attacked.

What is this type of behaviour called?

[1 mark]

Tick (✓) **one** box.

Huddling ☐

Innate ☐

Migration ☐

0 2 . 3 Pangolins live in trees or in burrows. Pangolins feed on insects.

Pangolins have adaptations that help them to survive in their environment.

The adaptations include:

- a long, sticky tongue
- hard scales covering the body
- long, sharp claws.

Suggest **two** ways the adaptations help a pangolin to survive.

[2 marks]

1 _____

_____

2 _____

_____

Do not write outside the box

Pangolins are captured by hunters who collect pangolin scales.

0 2 . 4 The hunters use sniffer dogs.

Explain why hunters use sniffer dogs to hunt for pangolins.

[2 marks]

0 2 . 5 Pangolins are in danger of dying out.

Government officials seized an illegal package of 120 kg of pangolin scales.

The mean mass of scales on one pangolin is 600 g.

Calculate the number of pangolins that will provide 120 kg of pangolin scales.

[3 marks]

Number of pangolins = _____

11

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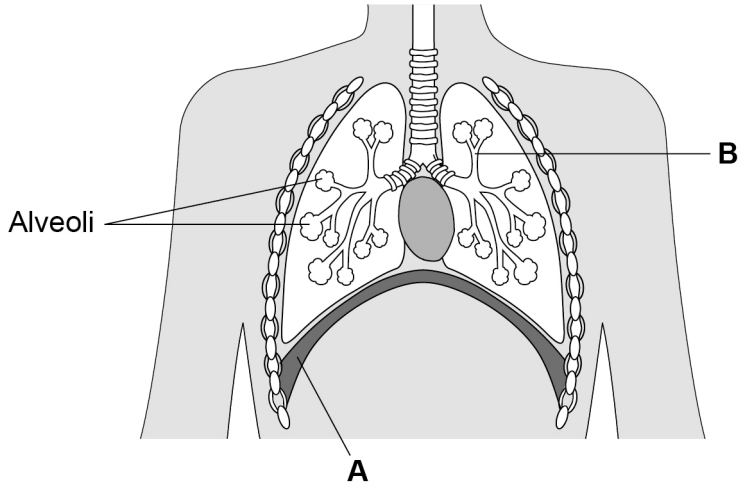
0 3 **Figure 4** shows the human breathing system.

Figure 4



0 3 . 1 What is structure **A**?

[1 mark]

Tick (✓) **one** box.

- Bronchiole ☐
- Diaphragm ☐
- Rib ☐
- Trachea ☐

0 3 . 2 What is structure **B**?

[1 mark]

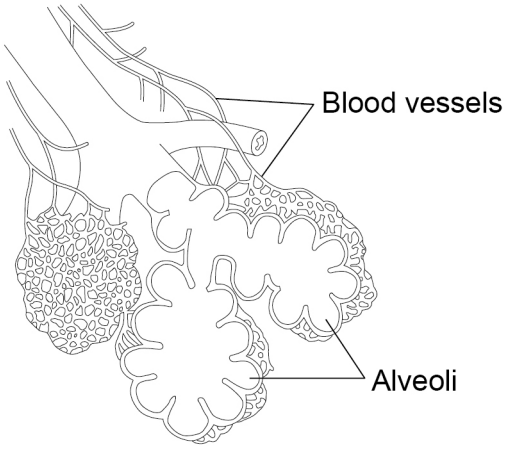
Tick (✓) **one** box.

- Bronchiole ☐
- Diaphragm ☐
- Rib ☐
- Trachea ☐

Do not write outside the box

Figure 5 shows alveoli surrounded by blood vessels.

Figure 5



A gas diffuses from the alveoli into the blood.

0 3 . 3 Name the gas that diffuses from the alveoli into the blood.

[1 mark]

0 3 . 4 Give **two** adaptations of the lungs that increase the rate of diffusion of the gas from the alveoli into the blood.

[2 marks]

1

2

Do not write outside the box

0 3 . 5 Lung disease reduces the rate of diffusion of the gas into the blood.

Explain why people become tired more easily when they develop lung disease.

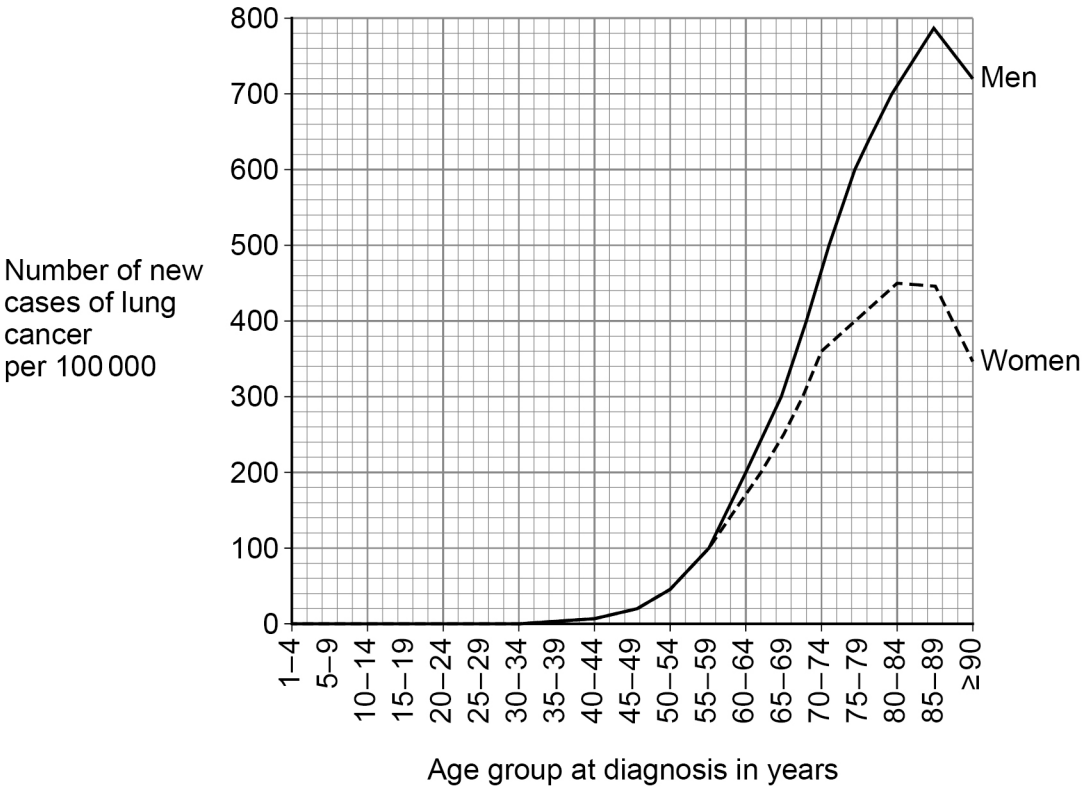
[3 marks]

Question 3 continues on the next page

Do not write outside the box

Figure 6 shows the number of new cases of lung cancer in different age groups in one year for one country.

Figure 6



0 3 . 6 Give **two** factors that affect the number of new cases of lung cancer.

Use **Figure 6**.

[2 marks]

1 _____

2 _____

0 3 . 7 In one year there were 500 000 men in the country who were aged 60–64.

Estimate the number of new cases of lung cancer in men aged 60–64 years.

Use **Figure 6**.

[2 marks]

_____

_____

Estimate = _____ new cases of lung cancer

12

Do not write outside the box

0 4 Fruit flies are small insects that are used in genetic investigations.

Figure 7 shows a fruit fly.

Figure 7

Fruit flies have chromosomes in their cells.

0 4 . 1 Which part of a cell contains chromosomes?

[1 mark]

Tick (✓) **one** box.

Nucleus ☐

Ribosome ☐

Vacuole ☐

0 4 . 2 Fruit flies have 8 chromosomes in each of their body cells.

Cells divide by meiosis to form gametes.

How many chromosomes are in a gamete from a fruit fly?

[1 mark]

Tick (✓) **one** box.

1 ☐

2 ☐

4 ☐

8 ☐

Do not write outside the box

Wing length in fruit flies is controlled by a gene with two different forms.

One form of the wing length gene (**N**) codes for normal wings.

One form of the wing length gene (**n**) codes for short wings.

0 4 . 3 What are the different forms of a gene called?

[1 mark]

Tick (✓) **one** box.

Alleles ☐

Characteristics ☐

Enzymes ☐

A scientist mated two fruit flies with **normal** wings.

Some of the offspring had normal wings and some of the offspring had short wings.

0 4 . 4 Complete the genetic diagram to show the cross.

[2 marks]

		Female	
		N	
Male	N		Nn
	n		nn

Do not write outside the box

0 4 . 5 What is the genotype of the fruit flies with short wings?

[1 mark]

Tick (✓) **one** box.

NN ☐

Nn ☐

nn ☐

The scientist mated two other fruit flies with normal wings.

There were 130 offspring.

- 105 fruit flies with normal wings.
- 25 fruit flies with short wings.

0 4 . 6 Determine the ratio of fruit flies with normal wings to fruit flies with short wings in the offspring.

[2 marks]

Ratio = _____ : 1

0 4 . 7 The scientist expected a ratio of **three** fruit flies with normal wings to **one** fruit fly with short wings (3:1).

Suggest **one** reason why the ratio in the offspring is **not** the same as the ratio the scientist expected.

[1 mark]

9

Do not write outside the box

0 5 Plants use carbon dioxide and water to make glucose by photosynthesis.

0 5 . 1 What is the source of the energy used for photosynthesis?

[1 mark]

_____

0 5 . 2 Name the gas produced by photosynthesis.

[1 mark]

_____

A farmer investigated the effect of carbon dioxide on the growth of cabbages.

The farmer planted two groups of cabbages.

Group **A** were grown in normal conditions.

Group **B** were given extra carbon dioxide.

0 5 . 3 Give **two** conditions that should be kept the same for both groups of cabbages.

[2 marks]

1 _____

_____

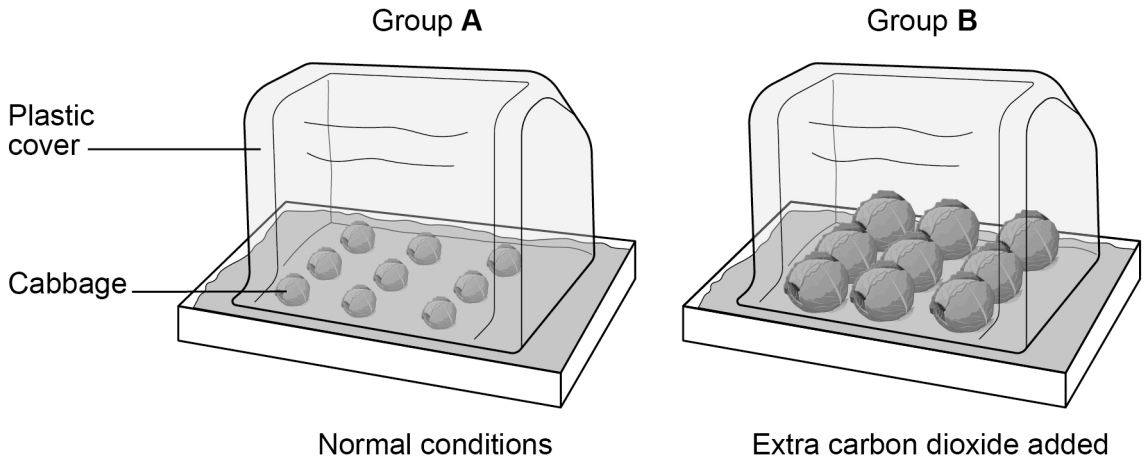
2 _____

_____

Do not write outside the box

0 5 . 4 **Figure 8** shows the two groups of cabbages 70 days after planting.

Figure 8



What is the effect of adding extra carbon dioxide on the growth of cabbages?

[1 mark]

0 5 . 5 A farmer wants to provide extra carbon dioxide for all his crops.

Suggest **two** factors the farmer should consider before paying for the extra carbon dioxide.

[2 marks]

1

2

Do not write outside the box

0 5 . 6 Cabbage root flies damage the roots of young cabbage plants.

Explain why plants infected with cabbage root flies are smaller than plants that do not have infected roots.

[3 marks]

10

Do not write outside the box

0 6 Different organisms live in different environmental conditions.

0 6 . 1 Loricifera are organisms that live at the bottom of a very deep sea.

Salt concentration increases as the depth of the sea increases.

Complete the sentence.

Choose the answer from the box.

[1 mark]

dark	**salty**	**warm**	**wet**

Loricifera are extremophiles because they live in conditions

that are very _____ .

0 6 . 2 What is an ecosystem?

[1 mark]

Tick (✓) **one** box.

A community of organisms adapted to particular conditions ☐

Animals adapted to abiotic conditions in the environment ☐

Plants living in the same place at the same time ☐

The changes taking place in an environment over time ☐

0 6 . 3 Animals compete with each other for food.

Give **one** other reason why animals compete with each other.

[1 mark]

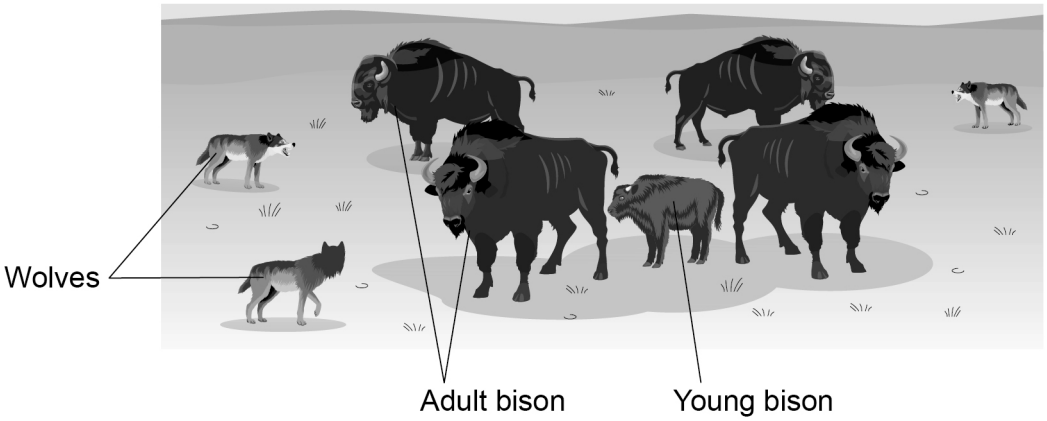
_____

_____

Do not write outside the box

Figure 9 shows the behaviour of bison and wolves in a grassland environment.

Figure 9



Bison eat grass.

0 6 . 4 The mass of grass eaten in one day by a bison is equal to 2% of the body mass of the bison.

The body mass of the bison is 560 kg.

Calculate the mass of grass eaten by the bison in one day.

[2 marks]

Mass of grass = _____ kg

Do not write outside the box

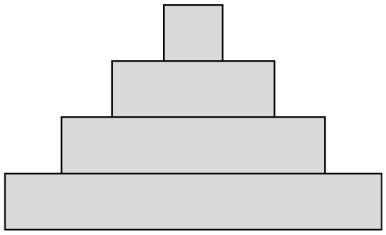
0 6 . 5 Wolves eat bison.

Wolves have small animals called mites living in their fur. The mites feed on wolf skin cells.

A pyramid of biomass shows the biomass of organisms at different feeding levels.

Complete the pyramid of biomass for the bison, grass, mites and wolves.

[2 marks]



0 6 . 6 Some of the material in the grass eaten by bison is used for growth.

Give **one** way that material in the grass eaten by the bison is returned to the environment.

[1 mark]

0 6 . 7 Suggest **one** behavioural adaptation used by bison to protect their young offspring from wolves.

Use **Figure 9**.

[1 mark]

9

Do not write outside the box

0 7 This question is about infectious disease.

0 7 . 1 Complete the sentence.

Choose the answer from the box.

[1 mark]

clones	**consumers**	**mutations**	**pathogens**

Microorganisms that cause infectious diseases are called _____ .

0 7 . 2 Which organisms produce toxins inside the body that cause a person to feel ill?

[1 mark]

Tick (✓) **one** box.

Algae ☐

Bacteria ☐

Plants ☐

Viruses ☐

Do not write outside the box

The immune system produces antibodies.

0 7 . 3 Antibodies are made of protein.

Complete the sentences about proteins.

Choose answers from the box.

[2 marks]

amino acids	**bases**	**fatty acids**	**genes**	**ions**

Each protein contains a particular sequence of _____ .

The sequence is determined by the order of DNA _____ .

Question 7 continues on the next page

Do not write outside the box

0 7 . 4 Every antibody has a specific shape to attach to a particular molecule.

Figure 10 shows the shape of the attachment sites on three antibodies.

Figure 10

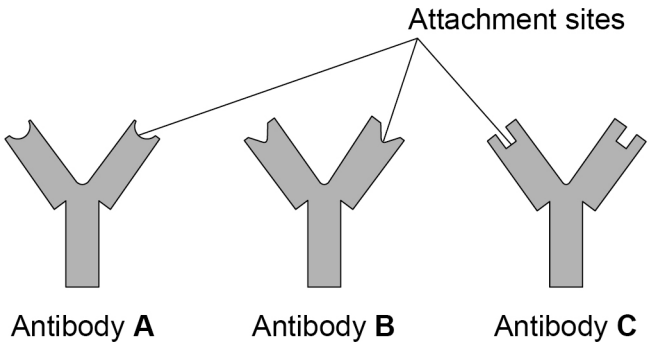
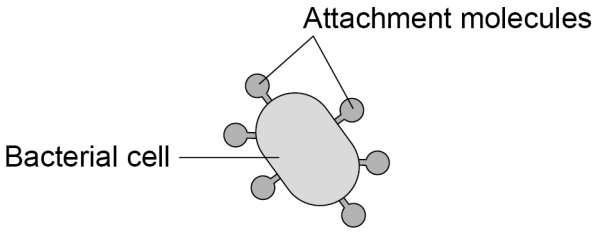


Figure 11 shows molecules on a bacterial cell that antibodies can attach to.

Figure 11



Which antibody in **Figure 10** will attach to the bacterial cell in **Figure 11**?

[1 mark]

Tick (✓) **one** box.

Antibody **A** ☐

Antibody **B** ☐

Antibody **C** ☐

Do not write outside the box

Vaccines are used to reduce the spread of infection in a population.

0 7 . 5 Describe what a vaccine contains to make a person produce a particular antibody.

[2 marks]

0 7 . 6 During the development of a new vaccine it is:

- tested in a laboratory
- tested on a small number of healthy people
- tested on a large number of healthy people.

Suggest **two** reasons why new vaccines are tested before they are used for everyone in the population.

[2 marks]

1

2

0 7 . 7 Antibiotics can also be used to reduce the spread of infections in a population.

Give **one** difference between the use of vaccines and the use of antibiotics.

[1 mark]

10

Do not write outside the box

0 8 Control systems keep conditions in the body constant.

0 8 . 1 Complete the sentences.

[2 marks]

The temperature of the blood is monitored by receptors in the

_____ centre.

The centre also receives nerve impulses from temperature receptors

in the _____ .

0 8 . 2 Give **two** ways the body reacts when the core body temperature is too high.

[2 marks]

1 _____

_____

2 _____

_____

Do not write outside the box

Insulin helps to control blood glucose levels.

0 8 . 3 Which organ produces insulin?

[1 mark]

_____

0 8 . 4 Explain why a person with diabetes should **not** eat food that contains a lot of glucose.

[2 marks]

_____

_____

_____

_____

Question 8 continues on the next page

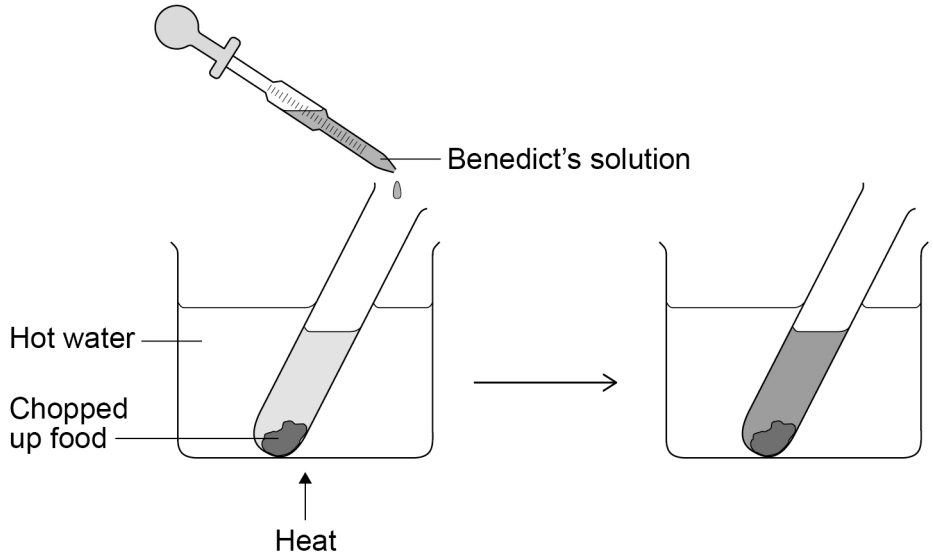
The glucose content of food can be tested with Benedict's solution.

Benedict's solution is added to a sample of food.

The mixture is heated.

Figure 12 shows a sample of food being tested for glucose.

Figure 12



The colour of the solution changes if glucose is present in the food.

Table 2 shows the colour of the solution for different concentrations of glucose.

Table 2

Concentration of glucose in %	Colour of solution after heating
0	blue
0.1	green
0.5	yellow
1.0	orange
2.0	red

Do not write outside the box

0 8 . 5 Plan an investigation to compare the glucose content of three different foods.

[6 marks]

0 8 . 6 Type 2 diabetes can be controlled by:

- careful diet
- injecting drugs into the body that help cells respond to insulin.

Suggest **two** advantages of using careful diet to control Type 2 diabetes rather than injecting drugs into the body.

[2 marks]

1

2

15

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ANSWER IN THE SPACES PROVIDED

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0 9 Energy is released in plant cells by respiration.

0 9 . 1 What do plants use the energy released by respiration for?

[2 marks]

Tick (✓) **two** boxes.

- Active transport ☐
- Breathing ☐
- Building up proteins ☐
- Diffusion ☐
- Photosynthesis ☐
- Producing oxygen ☐

0 9 . 2 Complete the word equation for **anaerobic** respiration in **plants**.

Choose answers from the box.

[2 marks]

carbon dioxide	**ethanol**	**lactic acid**	**oxygen**	**water**

glucose ⟶ _____ + _____

A scientist investigated the mass of sulfate ions absorbed by plant roots in aerobic conditions and in anaerobic conditions.

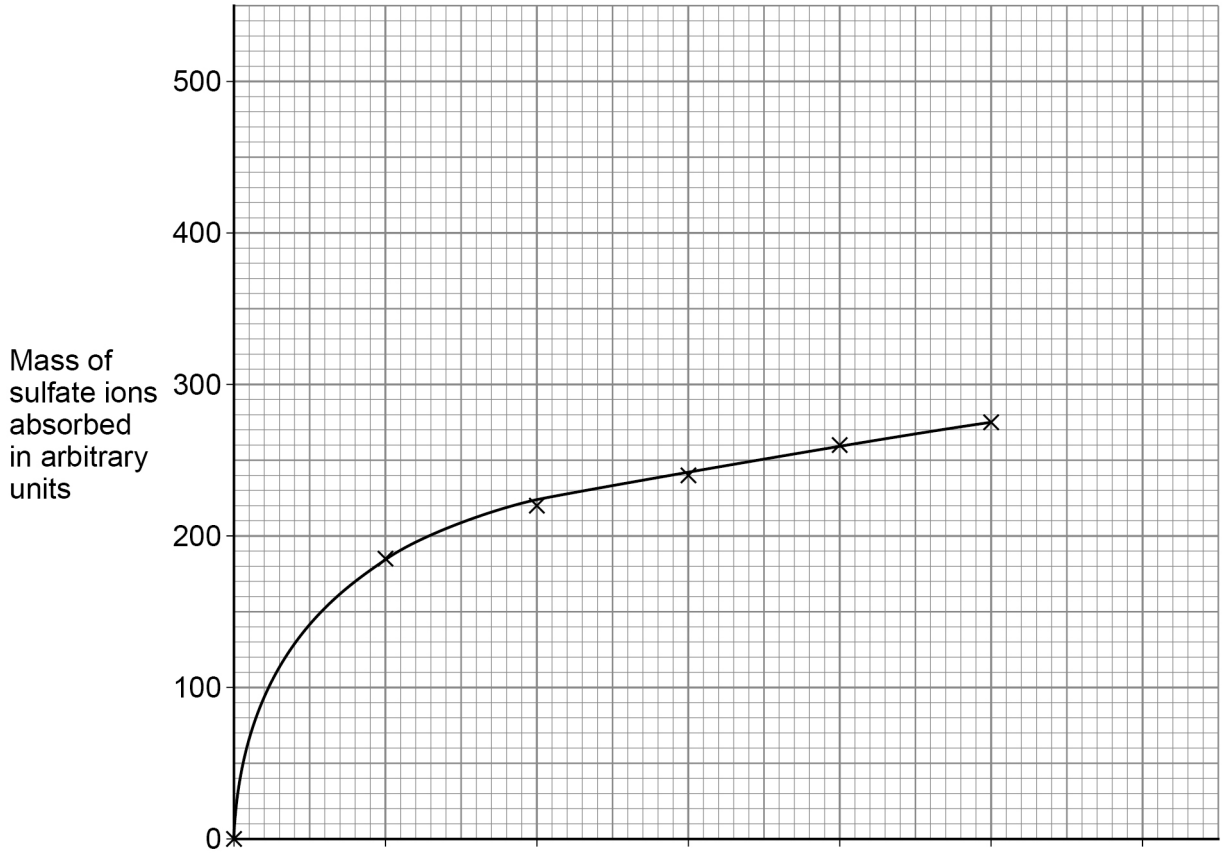
Table 3 shows the results.

Table 3

Time in hours	Mass of sulfate ions absorbed in arbitrary units	
	aerobic conditions	anaerobic conditions
0	0	0
1	220	185
2	340	220
3	425	240
4	475	260
5	500	275

Figure 13 shows the mass of sulfate ions absorbed in **anaerobic** conditions.

Figure 13



Do not write outside the box

0 9 . 3 Complete **Figure 13** to show the mass of sulfate ions absorbed in **aerobic** conditions.

You should:

- label the x-axis
- add a scale to the x-axis
- plot the data for aerobic respiration from **Table 3**
- draw a line of best fit.

[5 marks]

0 9 . 4 Determine the rate of sulfate ion absorption between 2 hours and 5 hours for the plant in **anaerobic** conditions.

Give your answer to 2 significant figures.

[3 marks]

Rate (2 significant figures) = _____ arbitrary units per hour

0 9 . 5 What do the results show about the absorption of sulfate ions by plants?

[2 marks]

Tick (✓) **two** boxes.

- Absorption of sulfate ions is faster when oxygen is present. ☐
- Oxygen causes the absorption of sulfate ions to slow down. ☐
- Oxygen must be present for absorption of sulfate ions. ☐
- Plant roots do not need oxygen to absorb sulfate ions. ☐
- Sulfate ions are absorbed faster in anaerobic conditions. ☐

END OF QUESTIONS

14

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ANSWER IN THE SPACES PROVIDED

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Question number	**Additional page, if required.** **Write the question numbers in the left-hand margin.**
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